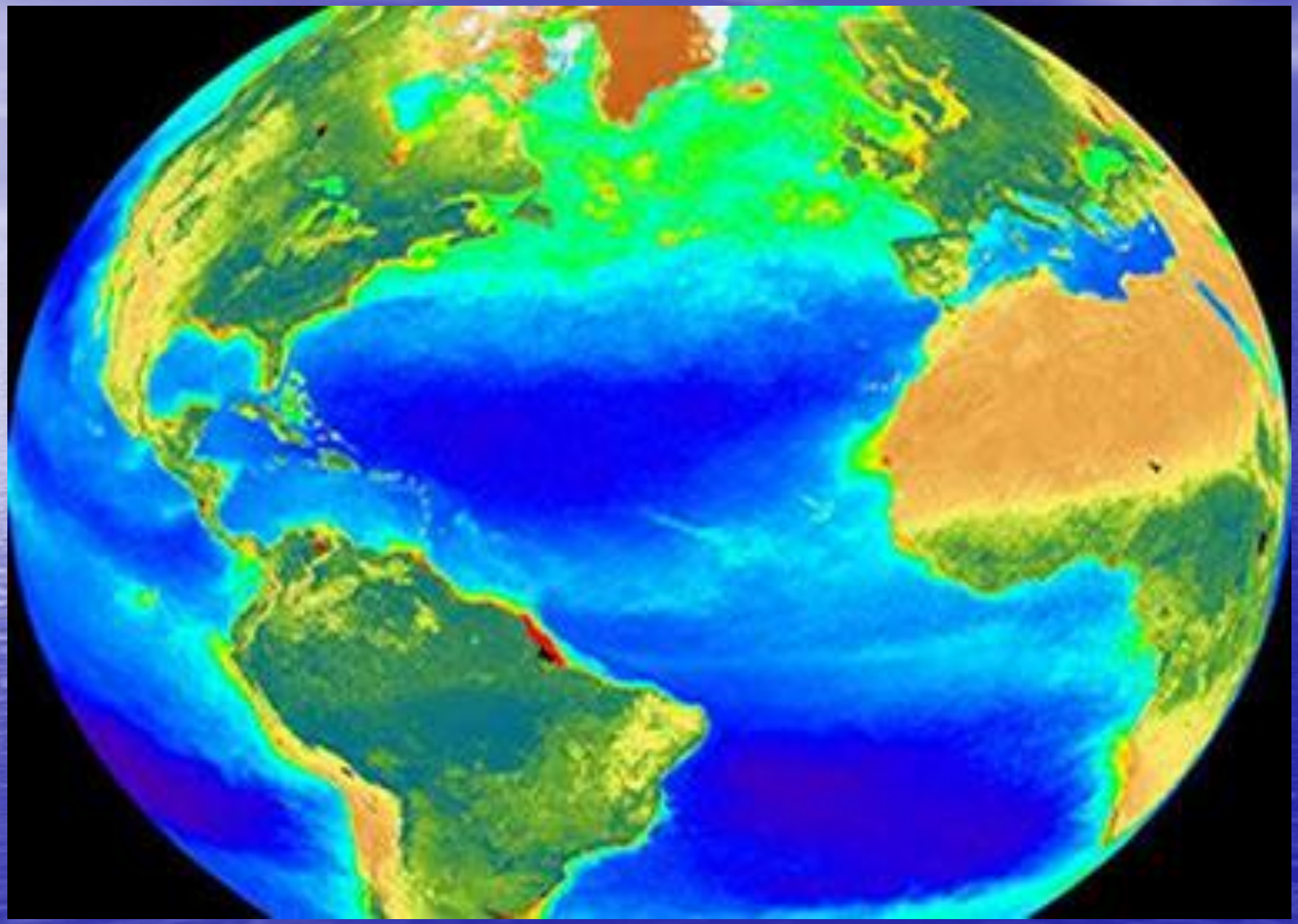
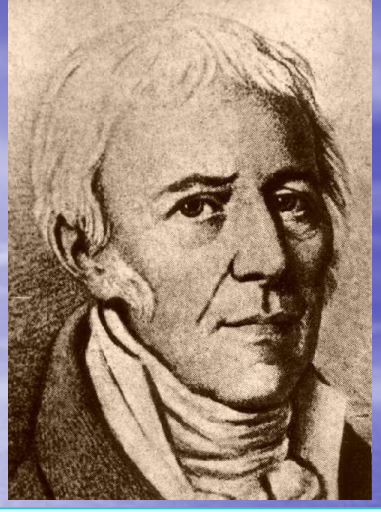

BIOSPHERE
corporation

- **The aim of lecture is** to form an idea of the biosphere's structure, the role of a living substance, evolution of the biosphere and mechanisms of its sustainable development

- **Major questions and short contents:**
  1. The Doctrine of V.I. Vernadskiy about biosphere and noosphere
  2. The concept of a living substance and its global role in the biosphere
  3. The concept of human impact as a strong geological and geochemical factor. The place of a man in the ecological system
  4. Global biogeochemical cycles
  5. Current problems of the biosphere

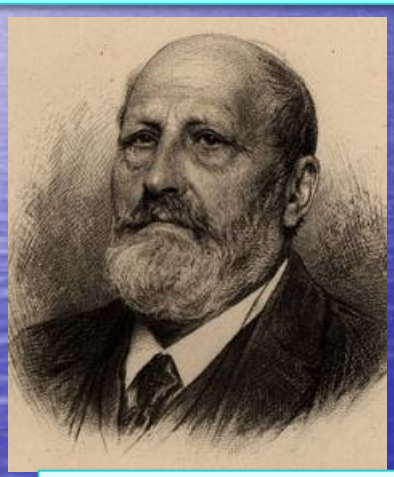


DOCTRINE Of BIOSPHER



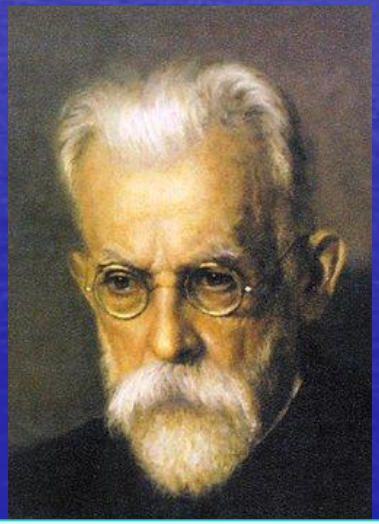
Jean-Batiste Lamarck (1744-1829)

The start of the doctrine of biosphere



Eduard Suess

Introduction of the term `Biosphere` in 1875



V.I. Vernadsky

An orderly doctrine of biospherea

- The **biosphere** is the global sum of all ecosystems.

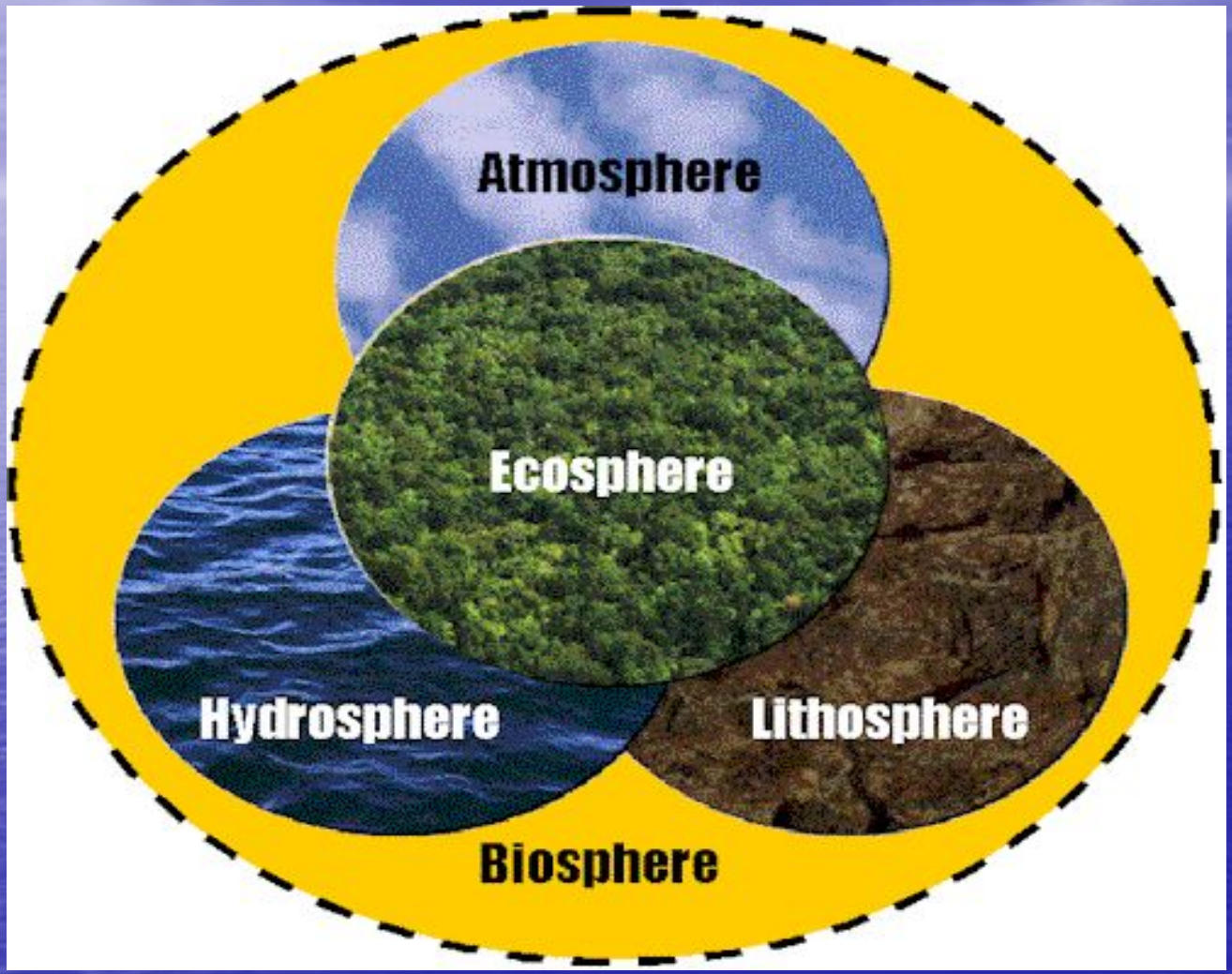
The Earth

Lithosphere (3 km depth)

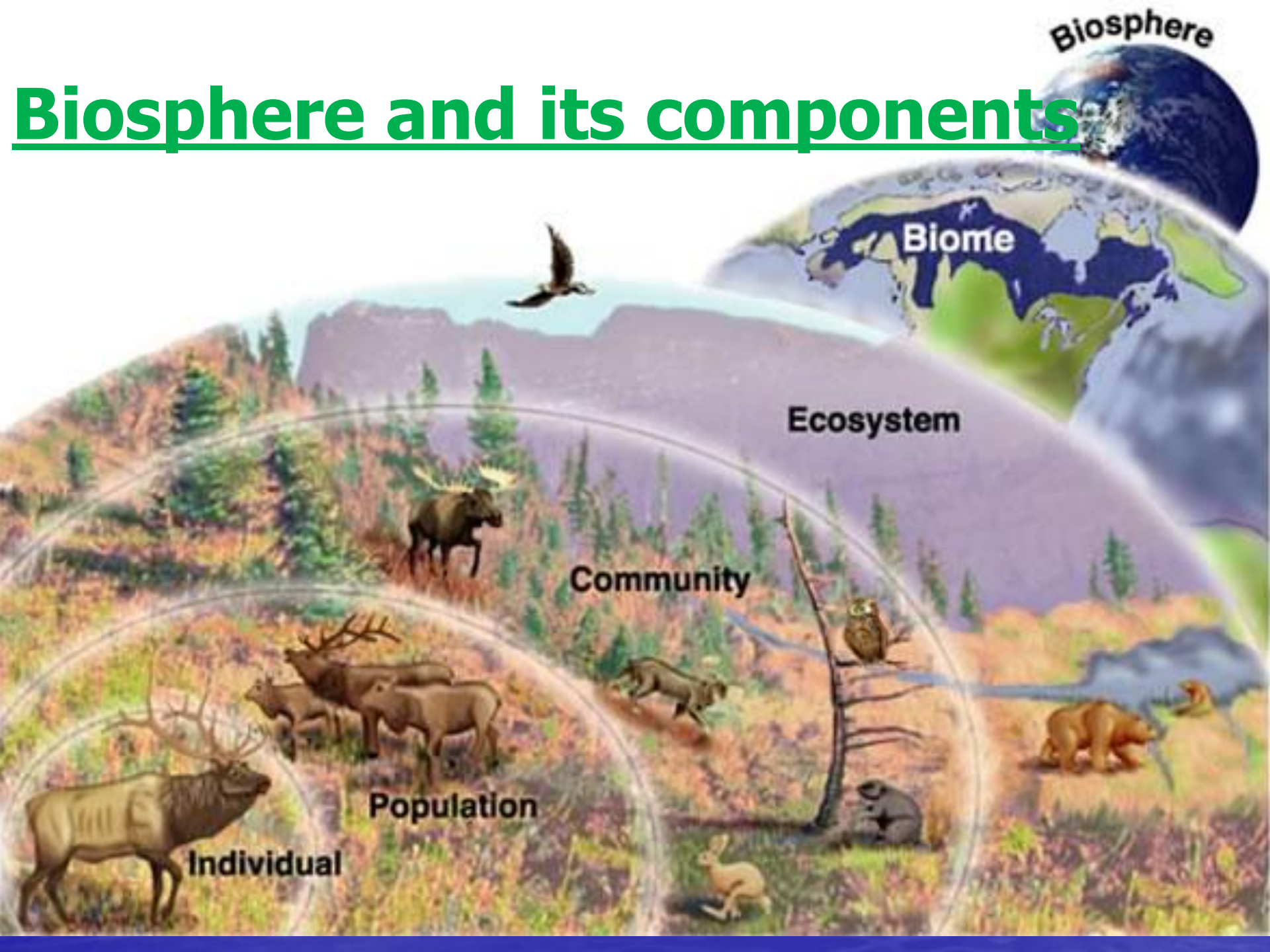
Atmosphere (16-20 km height)

Hydrosphere (11 km depth)

biospher


Atmosphere
Ecosphere
Hydrosphere
Lithosphere
Biosphere

Biosphere and its components



- **A major peculiarity of the biosphere is an available *living matter*, the aggregate of all living organisms being a powerful geological force.**

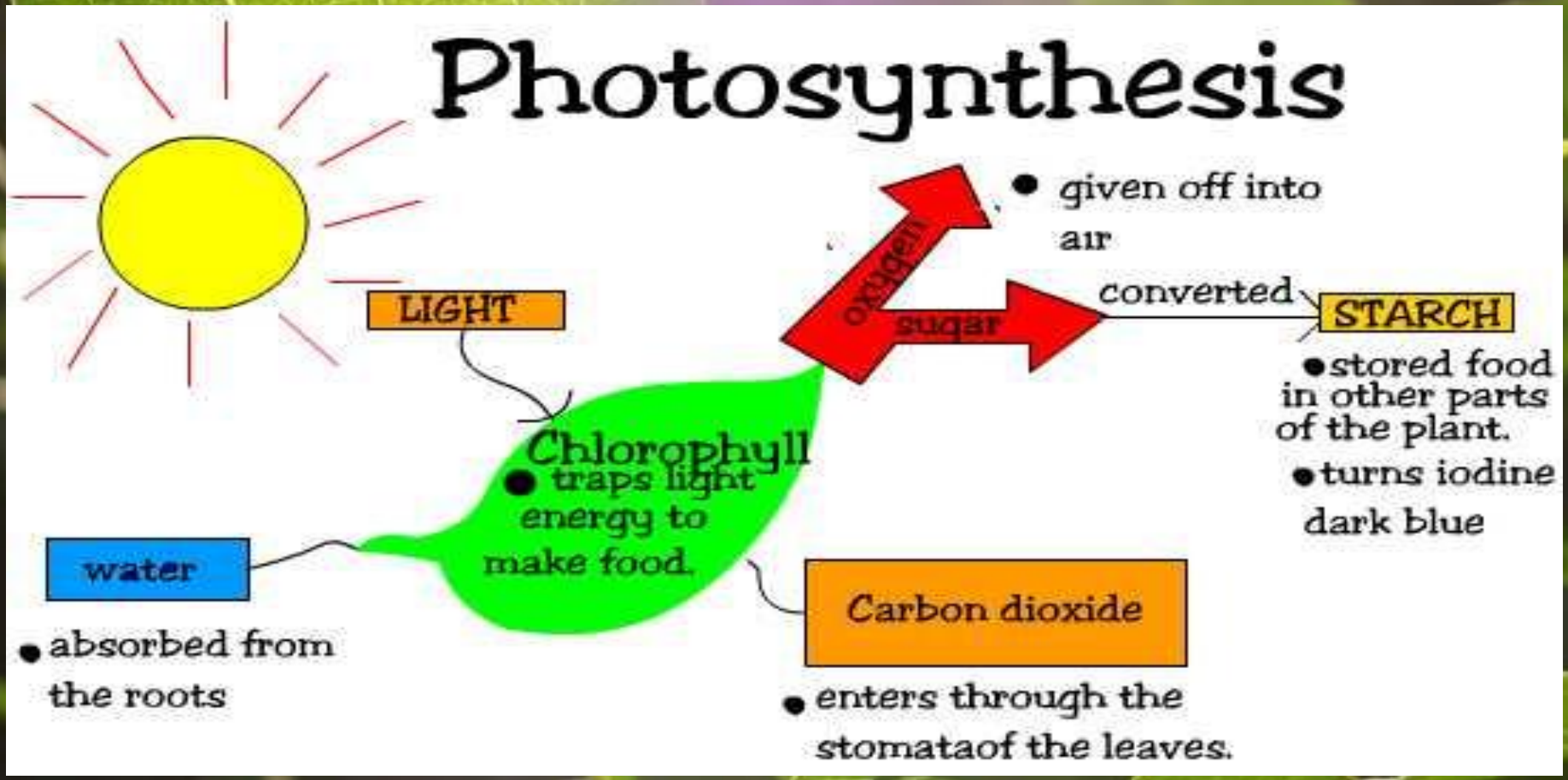
The living Matters of the Biosphere

The aggregate of all living organisms being a powerful geological force. In general living organisms have 7 main characteristics:

- Nutrition
- Respiration
- Growth
- Sensitivity
- Reproduction
- Movement
- Excretion

- **The living matter of the biosphere fulfills the following functions:**
  - *energy*
  - *destructive,*
  - *concentration,*
  - *environment-forming*

ENERGY


Photosynthesis
LIGHT
oxygen
sugar
given off into air
converted
STARCH
stored food in other parts of the plant.
turns iodine dark blue
Chlorophyll
traps light energy to make food.
water
absorbed from the roots
Carbon dioxide
enters through the stomataof the leaves.

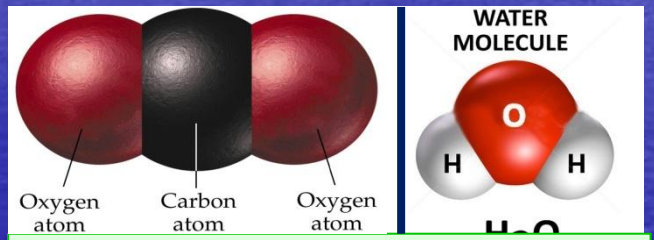
- Part of enegy may be accumulated in an extinct organic substance and transform into a fossil forming deposits of the following fossil fuels: mineral coal and oil being the energy base for human society.

The destructive function

…lies in degradation and mineralization of a dead organic matter, chemical decomposition of rocks and involving formed minerals in a biological cycle.

Dead organic matter

decomposes into



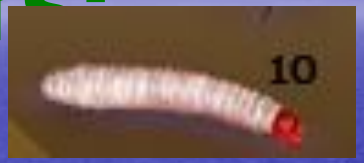
simple inorganic compounds

Destruction is made by

Fungi

Bacteria

House Fly



Larva

Ham Beetle

The concentration function

…implies that within their life activities, living matters concentrate(accumulate) chemical elements from diluted solutions that leading to a formation of deposits of natural minerals.

The most active concentrate is microorganisms

accumulate atoms

chalkstone

limestone

natural minerals

- **The destructive function** lies in degradation and mineralization of a dead organic matter, chemical decomposition of rocks and involving formed minerals in a biological cycle. The dead organic matter decomposes into simple inorganic compounds: carbon dioxide, water, hydrogen sulfide, methane, ammonia and others which are used again in the initial chain of the cycle. Special organisms – decomposers or destructors are engaged in this process.

- **The concentration function** implies that within their life activities, organisms accumulate selectively atoms of matters dissipated in the nature. One of a characteristic feature of a living matter is the ability to concentrate chemical elements from diluted solutions. The most active concentrate is microorganisms. Fulfilling this function induced formation of deposits of natural minerals (chalkstone, limestone etc).

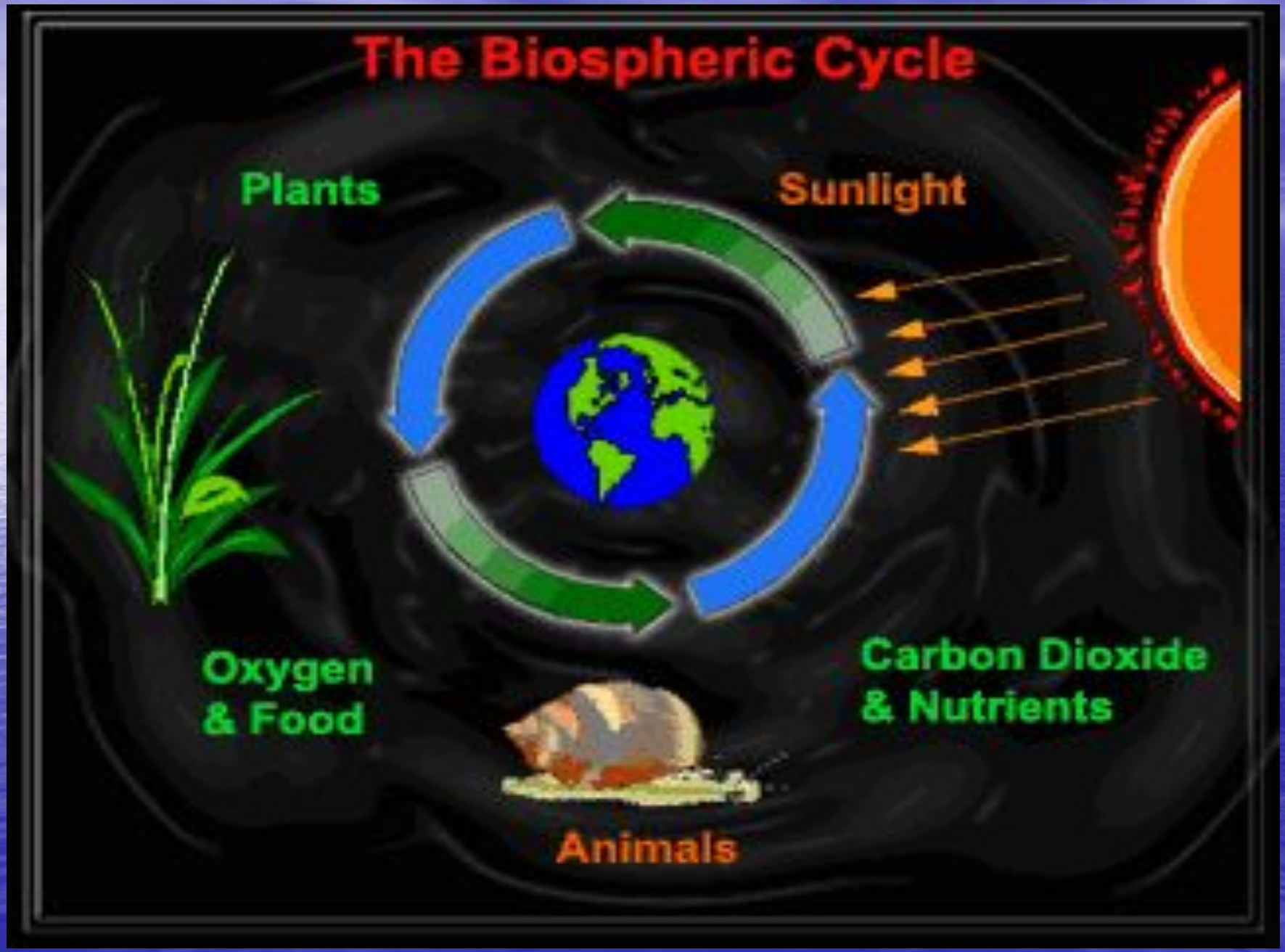
The environment-forming function lies is transformation of physical and chemical parameters of the environment (the atmosphere, the lithosphere and the hydrosphere) in conditions favourable for life of organisms. This function is a joint result of all three functions reviewed above of the living matter of the biosphere.

- **Due to this function the living matter has established and maintains the balance of the matter and energy in the biosphere, maintains the stability of organisms' life. The living matter is able to restore conditions and habitats destroyed as a result of natural disasters or business activities of people.**

As a result of the environment-forming function, in the geographical envelope of the Earth, the following important events:

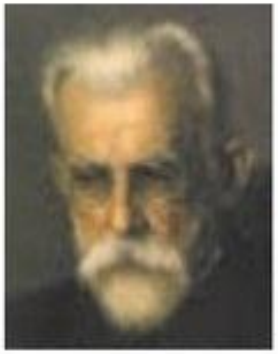
- transformation of gas composition of the primitive atmosphere,
- the change in the chemical composition of water in the primary ocean,
- formation of the sedimentary rock mass in the lithosphere, formation of a topsoil (fertile soil layer) on the surface of the

- **The basis of the living matter functioning in the biosphere is a biological cycle of matters which is provided by interrelations of three functional groups. The driving force of this cycle is solar energy.**


The Biospheric Cycle
Plants
Sunlight
Oxygen
& Food
Carbon Dioxide
& Nutrients
Animals

- Evolution of the biosphere led to the advent of noosphere (from a Greek word noos meaning mind), the sphere of mind, “an intellectual envelope”. The founder of the doctrine is V.I. Vernadskiy.

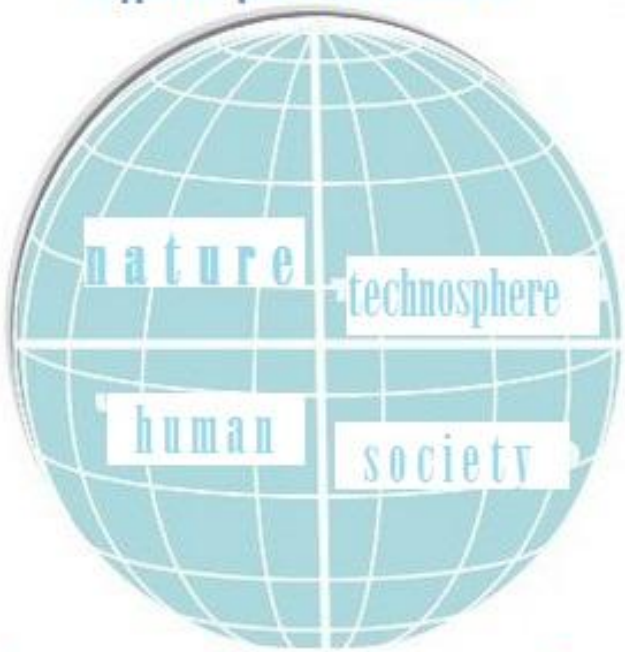
NEW STAGE OF THE DEVELOPMENT OF CIVILIZATION



"the biosphere has passed or, rather, into a new evolutionary state - to the noosphere - processed scientific thinking of social man"

V.I.VERNADSKY

technosphere should become an organic part of nature



the new face of noosphere

- V.I. Vernadskiy thought that the biosphere must turn to the noosphere as a natural result, and cognizing laws of nature and developing engineering a human being must add new features thereto being the features of a higher organization.

- The current period of the biosphere's development is characterized by a global contamination of the environment that leads to changes of its physical and chemical parameters and, as a result to reduction of a biological diversity and worsening the health of a man.

Thanks for attention